A.D. 1855 . . . . N° 699.

SPECIFICATION

OF

ALEXANDER McDOUGALL.

STEAM ENGINE AND OTHER FURNACES, &c.

LONDON:
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A.D. 1855 . . . . N° 699.

Steam Engine and other Furnaces, &c.

LETTERS PATENT to Alexander McDougall, of Manchester, in the County of Lancaster, Manufacturing Chemist, for the Invention of "An Improved Method of Consuming Smoke in Steam Engine or other Furnaces or Fire-places."

Sealed the 25th September 1855, and dated the 29th March 1855.

PROVISIONAL SPECIFICATION left by the said Alexander McDougall at the Office of the Commissioners of Patents, with his Petition, on the 29th March 1855.

I, Alexander McDougall, of Manchester, in the County of Lancaster, Manufacturing Chemist, do hereby declare the nature of my said Invention for "An Improved Method of Consuming Smoke in Steam Engine or other Furnaces or Fire-places" to be as follows:—

My improved method of consuming smoke in steam engine or other furnaces or fire-places consists in so arranging two furnaces or fire-places as to cause the unconsumed products of combustion or smoke arising from one fire which has just been replenished with fuel (and which I call the green fire) to pass over another fire or furnace from which the superabundant smoke has departed, and is consequently burning brightly. This is effected by means of suitable dampers and flues, and also by alternately "firing up." These dampers are so arranged, that upon one furnace being replenished its damper will be closed, and the damper of the other furnace opened, thus causing the draft, and carrying the smoke to be burned or consumed through the connecting flues between the two furnaces and over the second or bright fire, and from thence through the open damper up the chimney, or again under the boiler, and *vice versâ*; thus each furnace becomes alternately the producer and consumer of the smoke evolved from the coal.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Alexander M^{c}Dougall, in the Great Seal Patent Office on the 29th September 1855.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, Alexander M^{c}Dougall, of Manchester, in the County of Lancaster, Manufacturing Chemist, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-ninth day of March, in the year of our Lord One thousand eight hundred and fifty-five, in the eighteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Alexander M^{c}Dougall, Her especial license that I, the said Alexander M^{c}Dougall, my executors, administrators, and assigns, or such others as I, the said Alexander M^{c}Dougall, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "An Improved Method of Consuming Smoke in Steam Engine or other Furnaces or Fire-places," upon the condition (amongst others) that I, the said Alexander M^{c}Dougall, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Alexander M^{c}Dougall, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement and accompanying Drawings (that is to say):—

My improved method of consuming smoke in steam engine or other furnaces or fire-places consists in so arranging two furnaces or fire-places (that is within the boilers) as to cause the unconsumed products of combustion or the smoke arising from one fire which just been replenished with fuel, and which I call the "green fire," to pass over another fire or furnace from which the superabundant smoke has departed, and is consequently burning brightly. This

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Mc DOUGALL'S SPECIFICATION.

(1 SHEET.)

FIG. 1.

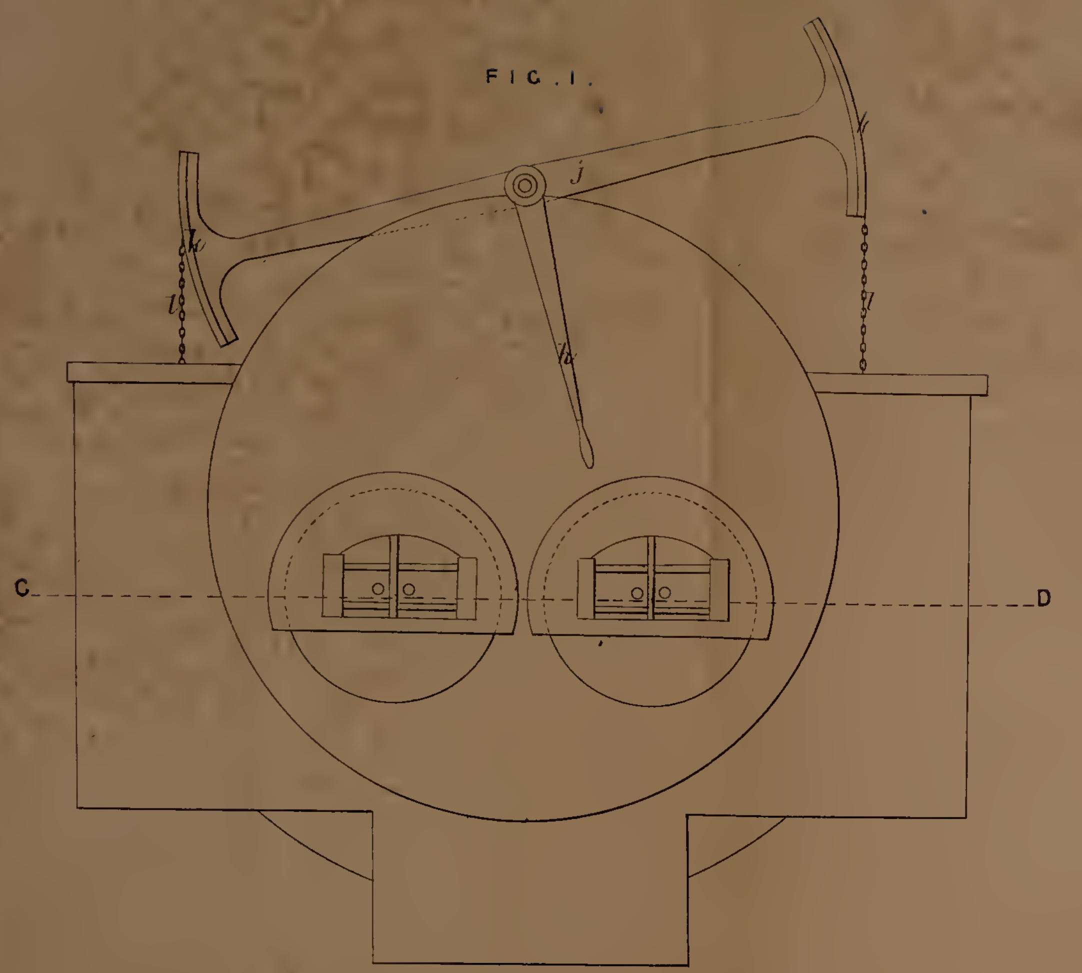


FIG. 2.

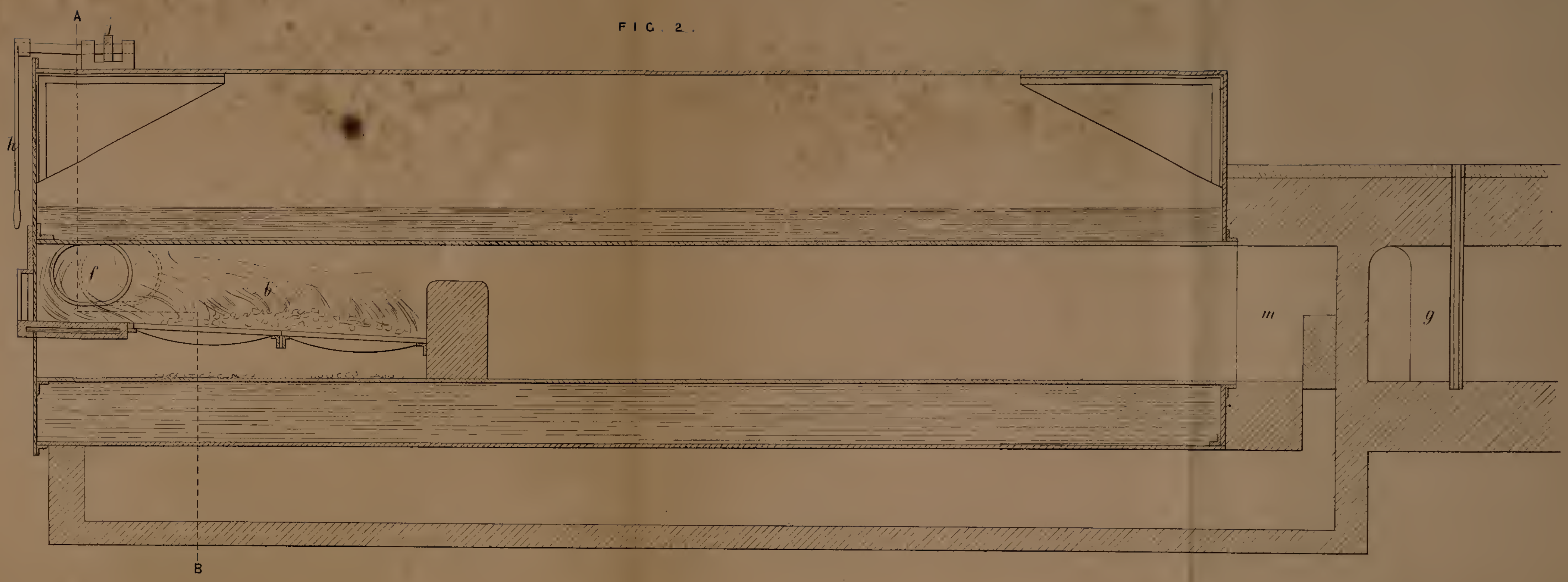


FIG. 3.

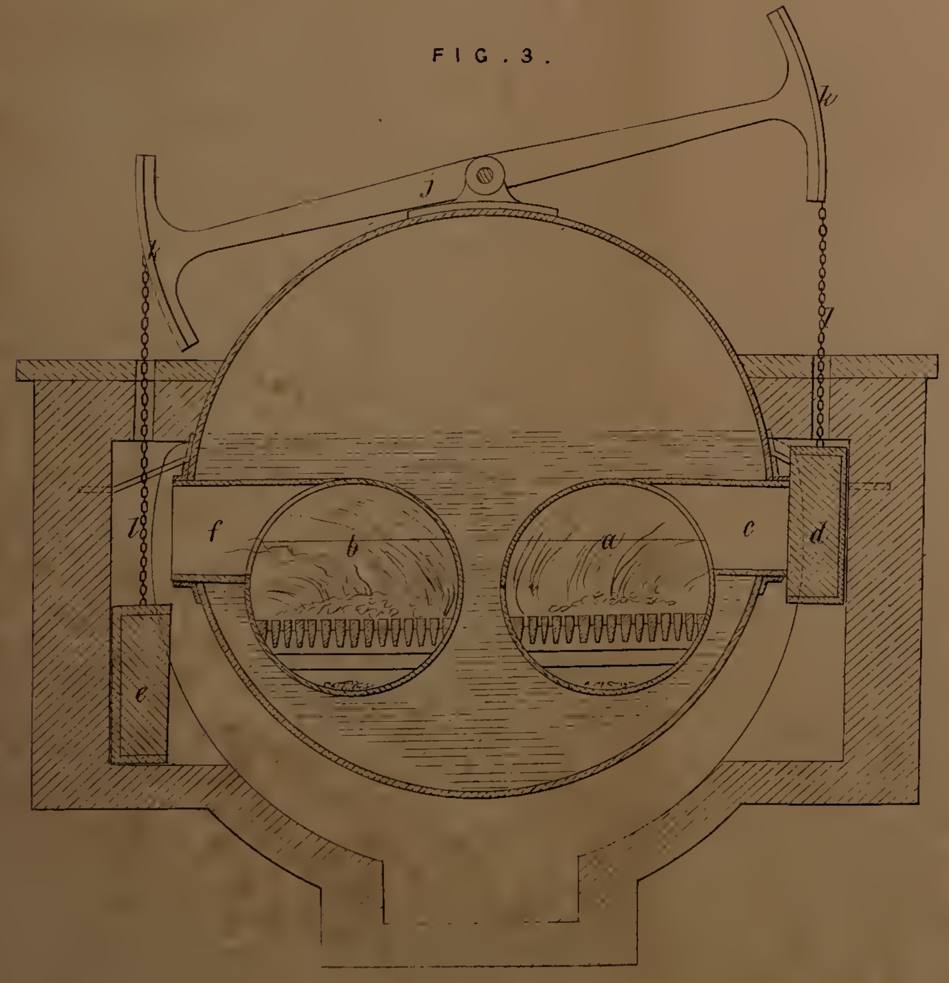
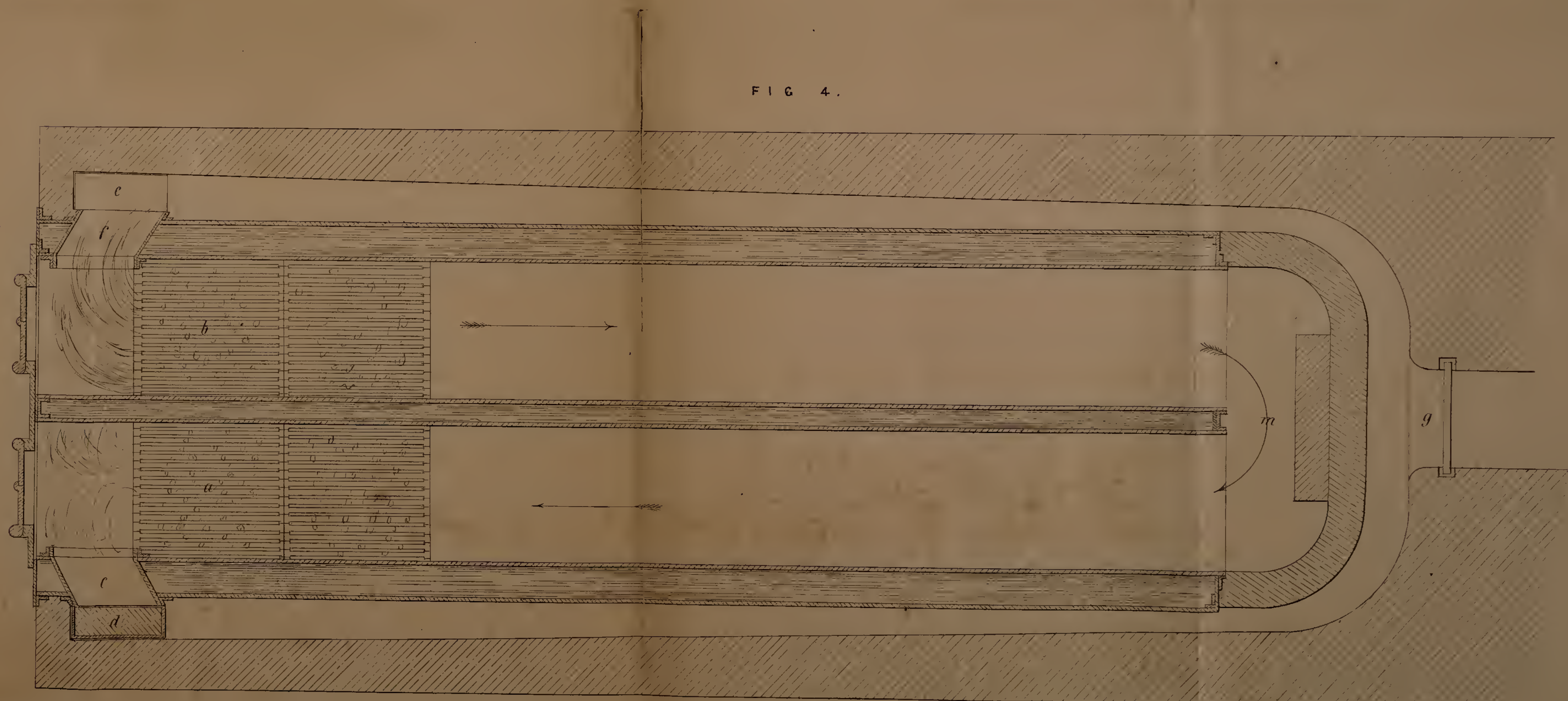


FIG. 4.



The filed drawing is partly colored.

Drawn on Stone by Malby & Sons.

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Printers to the Queen's most Excellent Majesty. 1855.

is effected by means of suitable dampers and flues, and also by alternately "firing up." These dampers are so arranged, that upon one furnace being replenished its damper will be closed, and the damper of the other furnace opened, thus causing the draught, and carrying the smoke to be burned or consumed through the connecting flue between the two furnaces and over the second or bright fire, and from thence through the open damper up the chimney, or again under the boiler, and *vice versa*; thus each furnace becomes alternately the producer and consumer of the smoke evolved from the coal.

In order that this Invention may be better understood and explained in detail, I have hereunto attached a Sheet of Drawing made to a scale of about half an inch to the foot, and having marked similar letters of reference upon corresponding parts of the apparatus in all the Figures.

Fig. 1 represents a front elevation of a steam boiler having two furnaces or fire-places within the boiler, and likewise shews an arrangement by which the dampers may be alternately and simultaneously elevated and depressed; Fig. 2 exhibits a longitudinal sectional elevation, taken vertically through the centre of one of the furnaces or fire-places of Fig. 1; Fig. 3 is a transverse sectional elevation, taken in the direction of the dotted line A, B, (Fig. 2); Fig. 4 represents a longitudinal section, taken horizontally on the dotted line C, D, (Fig. 1.)

This Invention will be most readily observed by referring in the first place to Fig. 4, where it will be remarked that the furnace or fire-place *a* is represented as having been just replenished with fuel (the damper *d* of the furnace or fire-place *a* being closed), and the consequent generation of dense smoke or unconsumed products of combustion is taking place. The fuel of the furnace or fire-place *b* having burnt brightly, the bed of the furnace *b* will present a "live fire," over which the smoke generated in the furnace *a* is compelled to pass, (a free channel for the circulation of the smoke between the furnaces being always open through the connecting flue *m* at the end of the boiler,) and in which passage the products of imperfect combustion forming the smoke and generated at the "green fire" in the furnace *a* is effectually consumed. This is effected by raising the damper *d*, and closing the flue *c* of the furnace *a* at the time of "firing up" the furnace *a*), and simultaneously lowering the damper *e* and opening the flue *f* of the furnace *b*, thus reversing the draught from the main flue *g*, and checking all egress for the unconsumed products of combustion from the "green fire" in the furnace *a*, except by the flue *f*, and immediately over and in contact with the bright and live fire in the furnace *b*, by which means the unconsumed products of combustion are rendered serviceable, a greater volume of heat obtained with perfect consumption of smoke, and consequent reduction of fuel employed. By the time that the fuel in the furnace *a* has attained a white heat, and perfect combustion is maintained, the fuel in the furnace *b* will have burnt down and exhausted itself, consequently requiring "firing up" or replenishing with fuel. The dampers *d* and *e* must now be respectively elevated and depressed, thus opening the flue *c* of the furnace *a* and closing the flue *f* of the furnace *b*. The current of the draught will now be reversed, and the superabundant smoke from the "green fire" in the furnace *b* will be carried in the direction of the arrows over the now "live fire" in the furnace *a*, where a perfect consuming of the smoke will take place, and the caloric continue its course through the flue *c* to the main flue *g*; thus it will be seen that by alternately closing and opening the flues *c* and *f* at the time of "firing up," an effective combustion of the smoke evolved from either furnace is attained. The dampers *e* and *d* are formed of a case or box of cast iron, open at one side and filled with fire brick, so that the face of the fire brick may always be presented to the flue. The dampers are actuated by the handle *h* in front of the boiler, the cross beam *j*, arcs *k*, *k*, and chains *l*, *l*, secured to the top of the iron case of the damper (see Figs. 1 and 3). For the purpose of keeping the fire doors cool, I propose to make the "dead plate" hollow, and to feed the boiler with water through the "dead plate."

Having now particularly described the nature of this Invention, and the manner in which the same may be performed, I wish it to be distinctly understood that I claim the novel and particular arrangement of flues and dampers to furnaces or fire-places where two or more are used in conjunction with each other, so that the draught may be reversed at will, in such a manner that the superabundant smoke of one furnace or fire-place may be made to pass over and in contact with the bright fire of the other for the purpose of ensuring its effectual consumption, as herein particularly described and set forth, and fully illustrated in the accompanying Drawing.

In witness whereof, I, the said Alexander M^cDougall, have hereunto set my hand and seal, this Twenty-eighth day of September, in the year of our Lord One thousand eight hundred and fifty-five.

A. M^cDOUGALL. (L.S.)

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